MESOZOIC AND PALEOZOIC SEDIMENTARY ROCKS

NORTHERN YELLOWSTONE

Ket EVERTS FORMATION, EAGLE SANDSTONE, AND TELEGRAPH

Kft FRONTIER FORMATION AND MOWRY AND THERMOPOLIS

MD MADISON GROUP AND THREE FORKS AND JEFFERSON

SHALE, AND FLATHEAD SANDSTONE

RCC CHUGWATER AND DINWOODY FORMATIONS

KJk KOOTENAI AND MORRISON FORMATIONS AND ELLIS GROUP

PPMa PHOSPHORIA FORMATION AND RELATED ROCKS, QUADRANT

DO THREE FORKS AND JEFFERSON FORMATIONS AND BIGHORN

O€ BIGHORN DOLOMITE, SNOWY RANGE FORMATION, PILGRIM

SANDSTONE, AND AMSDEN FORMATION—Intertonguing

LIMESTONE, PARK SHALE, MEAGHER LIMESTONE, WOLSEY

equivalent of part of the Phosphoria is Shedhorn Sandstone

KIC LANDSLIDE CREEK FORMATION

CREEK FORMATION

Kc CODY SHALE

KI LANCE FORMATION

Kle LEWIS SHALE

Kbl

Kp PIERRE SHALE

Kba BAXTER SHALE

Ks STEELE SHALE

Kc CODY SHALE

Kfh FOX HILLS SANDSTONE

Kmb MEDICINE BOW FORMATION

River Formation

Rock Springs uplift

Almond Formation

Ericson Sandstone

Blair Formation

Kn NIOBRARA FORMATION

Kf FRONTIER FORMATION

Js SUNDANCE FORMATION

Laramie Basin

TRPg GOOSE EGG FORMATION

PPc CASPER FORMATION

Mm MADISON LIMESTONE

€r CAMBRIAN ROCKS

Rock Springs Formation

Kcf CODY SHALE AND FRONTIER FORMATION

Ksn STEELE SHALE AND NIOBRARA FORMATION

THERMOPOLIS SHALES

Kmt MOWRY AND THERMOPOLIS SHALES

KJ CLOVERLY AND MORRISON FORMATIONS

RPcg CHUGWATER AND GOOSE EGG FORMATIONS

Pfs FORELLE LIMESTONE AND SATANKA SHALE

PPM CASPER FORMATION AND MADISON LIMESTONE

PM TENSLEEP SANDSTONE AND AMSDEN FORMATION

⊕ DEVONIAN AND DEVONIAN(?) KIMBERLITE INTRUSIVES

Pzr MADISON LIMESTONE AND CAMBRIAN ROCKS

PPcf CASPER AND FOUNTAIN FORMATIONS

AND SATANKA SHALE

KfI FOX HILLS SANDSTONE AND LEWIS SHALE

Kmv MESAVERDE GROUP—On Rawlins uplift includes Almond Formation

Knt NIOBRARA AND FRONTIER FORMATIONS, AND MOWRY AND

Kft FRONTIER FORMATION AND MOWRY AND THERMOPOLIS

KJs CLOVERLY, MORRISON, AND SUNDANCE FORMATIONS

RC CHUGWATER FORMATION OR GROUP—Includes overlying Jelm

RPjs JELM AND CHUGWATER FORMATIONS, FORELLE LIMESTONE,

MzPz MESOZOIC AND PALEOZOIC ROCKS—Shown in small areas of

Goose Egg Formations (Jurassic? through Permian)

South side of Granite Mountains north of Green Mountain - Nugget

South flank of Ferris Mountains - Nugget Sandstone and Chugwater

Northeast flank of Seminoe Mountains - Cloverly, Morrison, Sundance

Formations (Upper Triassic through Middle Pennsylvanian)

East flank of Laramie Mountains — Cloverly, Morrison, Sundance,

Chugwater, and Goose Egg Formations (Lower Cretaceous through

West flank of Sierra Madre — Chugwater, Goose Egg, Casper, and Fountain

Chugwater, and Goose Egg Formations, and, east of fault in T. 19 N.,

Casper Formation (Lower Cretaceous through Middle Pennsylvanian)

Sandstone, Chugwater and Goose Egg Formations, Tensleep

Sandstone, and Amsden Formation (Jurassic? through Upper

Formation in Shirley and Seminoe Mountains and at northern end of

Pine Ridge Sandstone, Allen Ridge Formation, and Haystack Mountains

Formation. In Laramie Basin includes Pine Ridge Sandstone and Rock

YELLOWSTONE

Upper Cretaceous <

Lower Cretaceous <

Upper Jurassic

Middle Jurassic <

Upper Triassic -

Lower Triassic -

Upper and Middle

Upper Mississippian <

Lower Mississippian /

Upper and Middle Silurian <

Upper Devonian

Lower Devonian <

Upper Ordovician

Middle Ordovician

Upper Cambiran

Middle Cambrian <

Kav ADAVILLE FORMATION

Kh HILLIARD SHALE

Ka ASPEN SHALE

Kbb BLIND BULL FORMATION

Kf FRONTIER FORMATION

Kbr BEAR RIVER FORMATION

Jkn Nugget sandstone

Pp PHOSPHORIA FORMATION

Mm MADISON GROUP

KI LANCE FORMATION

Kp PIERRE SHALE

Kcl CARLILE SHALE

Kmr MOWRY SHALE

Kfh FOX HILLS SANDSTONE

Kn NIOBRARA FORMATION

SHALES

Js SUNDANCE FORMATION

RC CHUGWATER FORMATION

TRPg GOOSE EGG FORMATION

TPS SPEARFISH FORMATION

PPm MINNELUSA FORMATION

Knc NIOBRARA FORMATION AND CARLILE SHALE

Kmt MOWRY AND THERMOPOLIS SHALES

Kgb GREENHORN FORMATION AND BELLE FOURCHE SHALE

Kns NEWCASTLE SANDSTONE AND SKULL CREEK SHALE

Jsg SUNDANCE AND GYPSUM SPRING FORMATIONS

Pmo MINNEKAHTA LIMESTONE AND OPECHE SHALE

FORMATIONS—Various combinations

MDe PAHASAPA AND ENGLEWOOD LIMESTONES

Devonian and Cambrian(?) age

Pzr MINNEKAHTA LIMESTONE, OPECHE SHALE, MINNELUSA

PPh HARTVILLE FORMATION—Lowermost unit may be Late Mississippian

MDg GUERNSEY FORMATION—Locally includes dolomite and sandstone of

O€ WHITEWOOD DOLOMITE, AND WINNIPEG AND DEADWOOD

Kgbm GREENHORN FORMATION AND BELLE FOURCHE AND MOWRY

KJ CLOVERLY FORMATION (HARTVILLE UPLIFT) OR INYAN KARA

GROUP (BLACK HILLS) AND MORRISON FORMATION

FORMATION, PAHASAPA AND ENGLEWOOD LIMESTONES,

WHITEWOOD DOLOMITE, AND WINNIPEG AND DEADWOOD

PPM WELLS AND AMSDEN FORMATIONS

SI LAKETOWN DOLOMITE — Uinta County

VENTRE FORMATION

MD MADISON GROUP AND DARBY FORMATION

SMITHS FOMATIONS

TWIN CREEK LIMESTONE

Figure 3. INDEX MAP SHOWING REGIONS OF MESOZOIC

Kss SAGE JUNCTION, QUEALY, COKEVILLE, THOMAS FORK, AND

Kg GANNETT GROUP—Includes Smoot Formation, Draney Limestone,

JRnd NUGGET SANDSTONE, ANKAREH FORMATION, THAYNES

Rad ANKAREH FORMATION, THAYNES LIMESTONE, WOODSIDE

SHALE, AND DINWOODY FORMATION

O€ BIGHORN DOLOMITE, GALLATIN LIMESTONE, AND GROS

NORTHEAST

PPMa PHOSPHORIA, WELLS, AND AMSDEN FORMATIONS

Jst STUMP FORMATION, PREUSS SANDSTONE OR REDBEDS, AND

LIMESTONE, WOODSIDE SHALE, AND DINWOODY

Kws WAYAN AND SMITHS FORMATIONS—One outcrop along Idaho border

Bechler Conglomerate, Peterson Limestone, and Ephraim Conglomerate

AND PALEOZOIC ROCKS DIFFERENTIATED IN CORRELATION DIAGRAMS

GEOLOGIC MAP OF WYOMING

EXPLANATION

Compiled by J. D. Love and Ann Coe Christiansen U.S. Geological Survey, 1985

Figure 2. INDEX MAP SHOWING REGIONS OF QUATERNARY

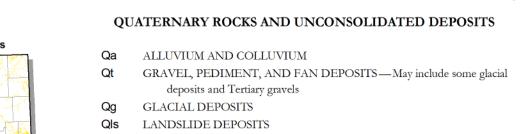
AND TERTIARY ROCKS DIFFERENTIATED IN

For reference, figure 1 shows selected geographic and tectonic features in Wyoming. Stratigraphic nomenclature differs in various parts of the State of Wyoming; therefore the State has been divided into several geographic areas in order to show the localities where specific stratigraphic units occur. The boundaries of the areas are approximate and remnants of some units are present beyond these boundaries. The geographic areas used for rocks of Quaternary and Tertiary age are shown on figure 2, and the areas for rocks of Mesozoic and Paleozoic age are on figure 3. Small index maps showing rocks of a particular age are shown adjacent to the list of map units. Precambrian rocks are not listed geographically in the CORRELATION DIAGRAMS AND LIST OF MAP UNITS; however in the description of stratigraphic units they are described for each mountain range or other area in which they occur. Some Quaternary and Tertiary surficial deposits occur aroughout the State; consequently no geographic area is designated. The correlation diagrams show age ranges of map units; where a major unconformity separates individually described

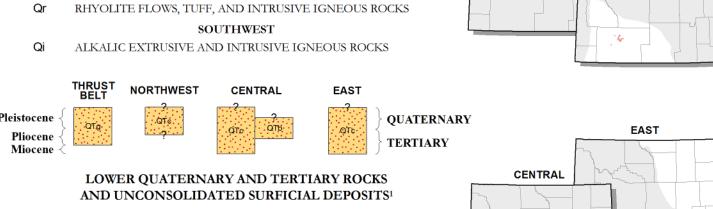
stratigraphic units that are combined in a single map unit, the age range is designated by a double-headed arrow. A query (?) at one or both ends of the arrow indicates uncertainty as to extent of range

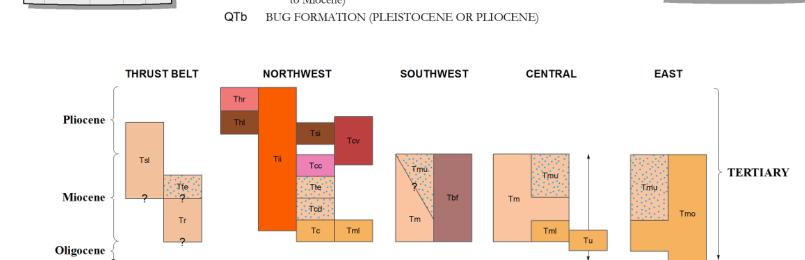
0 50 100 150 Kilometers Figure 1. INDEX MAP SHOWING SELECTED GEOGRAPHIC AND TECTONIC FEATURES IN WYOMING CORRELATION DIAGRAMS AND LIST OF MAP UNITS

QUATERNARY ROCKS AND UNCONSOLIDATED DEPOSITS Quaternary Rocks Qa ALLUVIUM AND COLLUVIUM



Qs DUNE SAND AND LOESS QI PLAYA LAKE AND OTHER LACUSTRINE DEPOSITS Qu UNDIVIDED SURFICIAL DEPOSITS NORTHWEST Qb BASALT FLOWS AND INTRUSIVE IGNEOUS ROCKS





QTg TERRACE GRAVEL (PLEISTOCENE AND/OR PLIOCENE)

Medicine Bow Mountains and east of Laramie Mountains (Pleistocene

Jackson Hole (Pleistocene or Pliocene)

QTc CONGLOMERATE

UPPER AND UPPERMOST LOWER TERTIARY SEDIMENTARY AND IGNEOUS ROCKS² THRUST BELT Tsl SALT LAKE FORMATION Tte TEEWINOT FORMATION Tr RED CONGLOMERATE ON TOP OF HOBACK AND WYOMING RANGES (MIOCENE?: MAY BE AS OLD AS EOCENE)

NORTHWEST

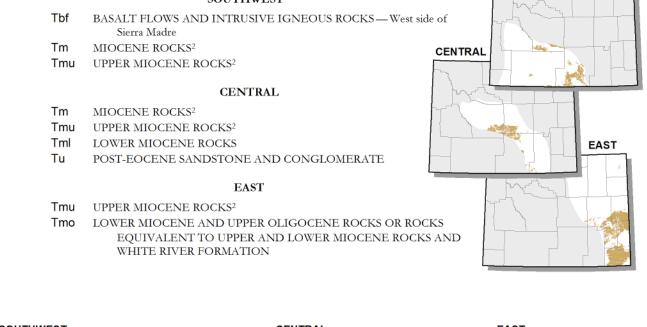
Thr HUCKLEBERRY RIDGE TUFF OF YELLOWSTONE GROUP ii INTRUSIVE AND EXTRUSIVE IGNEOUS ROCKS Thl HEART LAKE CONGLOMERATE — Southern Yellowstone area Tsi SHOOTING IRON FORMATION²—Central Jackson Hole Tcc CONANT CREEK TUFF — Northern Jackson Hole Tte TEEWINOT FORMATION—Central Jackson Hole

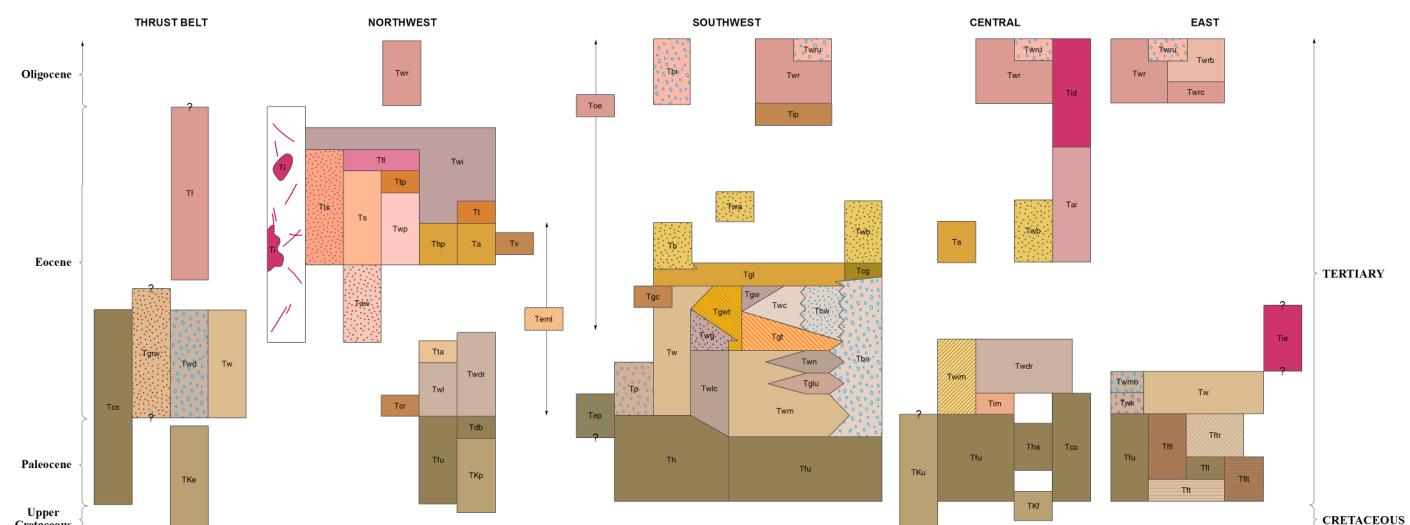
Tcd CAMP DAVIS FORMATION—Southernmost Jackson Hole

Tc COLTER FORMATION—Central Jackson Hole

Tml LOWER MIOCENE ROCKS—Bighorn Mountains

Tm MIOCENE ROCKS² Tmu UPPER MIOCENE ROCKS² Tm MIOCENE ROCKS² Tmu UPPER MIOCENE ROCKS² Tml LOWER MIOCENE ROCKS Tmu UPPER MIOCENE ROCKS² cv CALDWELL CANYON VOLCANICS — Southern Absaroka Range WHITE RIVER FORMATION







THRUST BELT Tf FOWKES FORMATION (PLIOCENE? AND EOCENE) Tcs CONGLOMERATE OF SUBLETTE RANGE Tgrw GREEN RIVER AND WASATCH FORMATIONS WASATCH FORMATION Twd Diamictite and sandstone

Tw Main body TKe EVANSTON FORMATION NORTHWEST Twr WHITE RIVER FORMATION Ti INTRUSIVE IGNEOUS ROCKS

Cretaceous

THOROFARE CREEK GROUP Wiggins Formation Two Ocean and Langford Formations—In places may include

Trout Peak Trachyandesite of Sunlight Group Tepee Trail Formation Avcross Formation THOROFARE CREEK AND SUNLIGHT GROUPS— Includes Two Ocean and Langford Formations, Trout Peak Trachyandesite, and Wapiti Formation SUNLIGHT GROUP - Includes Trout Peak Trachyandesite,

Wapiti Formation, Crescent Hill Basalt, and Mount Wallace

Trout Peak Trachyandesite Wapiti Formation HOMINY PEAK FORMATION WASHBURN GROUP -- includes Sepulcher, Lamar River, and Cathedral Cliffs Formations Teml MIDDLE AND LOWER EOCENE ROCKS—Equivalent to Aycross and Wind River Formations

TV VOLCANIC CONGLOMERATE — Jackson Hole Twdr WIND RIVER FORMATION—At base locally includes equivalent of Indian Meadows Formation Tta TATMAN FORMATION

Twl WILLWOOD FORMATION Tcr CRANDALL CONGLOMERATE — East flank of Absaroka Range Tfu FORT UNION FORMATION Tdb DEVILS BASIN FORMATION TKp PINYON CONGLOMERATE

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Tbi BISHOP CONGLOMERATE Twr WHITE RIVER FORMATION Twru Upper conglomerate member

Toe OLIGOCENE AND (OR) UPPER AND MIDDLE EOCENE ROCKS Tip ICE POINT CONGLOMERAT Twa WASHAKIE FORMATION Twb WAGON BED FORMATION Tb BRIDGER FORMATION

OF WASATCH FORMATION GREEN RIVER FORMATION

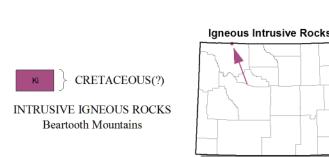
Tcq CROOKS GAP CONGLOMERATE Tgc GRANITIC CONGLOMERATE ABOVE OR IN UPPER PART Laney Member Wilkins Peak Member Tgwt Wilkins Peak Member and Tipton Shale Member or Tongue

Tipton Shale Member or Tongue Luman Tongue WASATCH AND GREEN RIVER FORMATIONS

Twg New Fork Tongue of Wasatch and Fontenelle Tongue or Member WASATCH FORMATION

Twc Cathedral Bluffs Tongue Twn Niland Tongue Twm Main body Twlc La Barge and Chappo Members Tbw Transitional unit between Battle spring and WASATCH FORMATIONS Tbs BATTLE SPRING FORMATION Tp PASS PEAK FORMATION AND EQUIVALENTS

Tep CONGLOMERATE OF ROARING CREEK (EOCENE OR Th HOBACK FORMATION Tfu FORT UNION FORMATION



Twr WHITE RIVER FORMATION

Twru Upper conglomerate member

Twb WAGON BED FORMATION

Twdr WIND RIVER FORMATION

Tco COALMONT FORMATION

Tfu FORT UNION FORMATION

Twr WHITE RIVER FORMATION

Twru Upper conglomerate member

Tw WASATCH FORMATION

Twk Kingsbury Conglomerate Member

Tongue River and Lebo Members

Lebo and Tullock Members

Tfu FORT UNION FORMATION

Tha HANNA FORMATION

TKf FERRIS FORMATION

Twrc Chadron Member

Twmo Moncrief Member

Tftr Tongue River Member

Lebo Member

Tft Tullock Member

Tim INDIAN MEADOWS FORMATION

Ta AYCROSS FORMATION

Tid DACITE AND QUARTZ LATITE INTRUSIVE AND

Tai ALKALIC INTRUSIVE AND EXTRUSIVE IGNEOUS

Twim WIND RIVER AND INDIAN MEADOWS FORMATIONS

TKu SEDIMENTARY ROCKS—Northern part of Wind River Basin

Twrb Brule Member—Locally includes upper conglomerate member

Incorporates masses of Mississippian through Cambrian

Tie INTRUSIVE AND EXTRUSIVE IGNEOUS ROCKS—

EXTRUSIVE IGNEOUS ROCKS

BASE MAP REFERENCES Bureau of Land Management, 2011, Cadastral National Spatial Data Infrastructure (CadNSDI) Public Land Survey System (PLSS) for Wyoming, at http://www.geocommunicator.gov/geocomm/ lsis_home/home Huss, J.M., 2002, Railroads for Wyoming: Wyoming State Geological Survey Map Series 55, scale 1:500,000, National Oceanic and Atmospheric Administration, 1985, Digital magnetic declination: National Geophysical Data Center, at http://www.ngdc.noaa.gov/geomagmodels/struts/calcDeclination.

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1:2,000,000 (modified), at http://piney.wygisc.uwyo.edu/data/geology/continentaldivide.zip.

http://cama.state.wv.us/districts/mapdocs/GIS/STAMUN10.ZIP.

Wyoming Geographic Information Science Center, 2010, Municipalities in Wyoming at 1:24,000, at

——— U.S. highway —— State highway Lake or reservoir County or other road ------ Railroad FOOTNOTES ¹ Query indicates uncertainty of position of top of unit within the Pleistocene. ³ Karlstrom and others (1983). ² Age of upper parts of uppermost Miocene units is problematic. These parts have historically been assigned to the Pliocene. Successive reductions in radiometric age of the top of the Miocene in Europe to 7 Ma (Lambert, 1971) and to 5 Ma (Berggren, 6 Snyder (1980). 1972) place a Pliocene age in question, although the top beds of the formations have McCallum (1968).

CITIES AND TOWNS

City or town

LANDFORMS

Landform

▲ Mountain peak

TRANSPORTATION

— Interstate highway

not been dated.

State capital

BASE MAP EXPLANATION BOUNDARIES Continental divide State boundary National park boundary County boundary Township boundary Geographic center of Wyoming (Calculated centroid) Perennial river Perennial stream Ephemeral or intermittent Canal

downthrown side of normal fault SHEAR ZONE IMPACT STRUCTURE–Not exposed; determined by drilling; date of Klaenhammer, written commun., 1980)

descriptions only where the brackets beside the boxes do not indicate the specific age of the unit. Ages are given in Ma, Mega-annum (million years).

fans, terraces, and slopes. Qa Range. Locally includes some Tertiary gravels. Qt deposits, talus, and rock-glacier deposits. QIs northwestern Wyoming is chiefly loess (age 12,000-19,000 years). Qs silt, and fine sand. Includes travertine deposits. QI Mountains. Qu

JURASSIC(?) AND

PENNSYLVANIAN

TRIASSIC(?)

PERMIAN

SILURIAN

KI LANCE FORMATION

Hills, and Lewis

KfI FOX HILLS SANDSTONE AND LEWIS SHALE

Kfb FOX HILLS SANDSTONE AND BEARPAW SHALE

Kml MEETEETSE FORMATION AND LEWIS SHALE

Kcf CODY SHALE AND FRONTIER FORMATION

Kmt MOWRY AND THERMOPOLIS SHALES

Ksb SOHARE FORMATION AND BACON RIDGE SANDSTONE

Kft FRONTIER FORMATION AND MOWRY AND THERMOPOLIS

KJg CLOVERLY, MORRISON, SUNDANCE, AND GYPSUM SPRING

KT CLOVERLY, MORRISON, SUNDANCE, AND GYPSUM SPRING

JR SUNDANCE AND GYPSUM SPRING FORMATIONS AND NUGGET

JTGN GYPSUM SPRING FORMATION AND NUGGET SANDSTONE—Wind

JRgc GYPSUM SPRING FORMATION, AND NUGGET SANDSTONE, AND

JRnd NUGGET SANDSTONE AND CHUGWATER AND DINWOODY

MzPz MESOZOIC AND PALEOZOIC ROCKS—Shown in small areas of

(Lower Triassic through Upper Mississippian)

East flank of Absaroka Range — Dinwoody Formation, Phosphoria

Pp PHOSPHORIA FORMATION AND RELATED ROCKS—Intertonguing

PPMa PHOSPHORIA FORMATION AND RELATED ROCKS, TENSLEEP

Mm MADISON LIMESTONE OR GROUP—Includes wedge edge of Bighorn

SANDSTONE AND AMSDEN FORMATION

PPM CASPER FORMATION AND MADISON LIMESTONE

PM TENSLEEP SANDSTONE AND AMSDEN FORMATION

Formation and related rocks, Tensleep Sandstone, and Amsden Formation

equivalents of parts of Phosphoria are Park City Formation and Shedhorn

East flank of Bighorn Mountains — Cloverly, Morrison, Sundance, Gypsum

Spring, Chugwater, and Goose Egg Formations (Lower Cretaceous

FORMATIONS AND NUGGET SANDSTONE

Jsg SUNDANCE AND GYPSUM SPRING FORMATIONS

CHUGWATER FORMATION

RCC CHUGWATER AND DINWOODY FORMATIONS

RPcg CHUGWATER AND GOOSE EGG FORMATIONS

KJ CLOVERLY AND MORRISON FORMATIONS—In southern Yellowstone

KJs CLOVERLY, MORRISON, AND SUNDANCE FORMATIONS—Includes

area and Jackson Hole the presence of the Morrison is questionable

wedge edge of Nugget Sandstone in T. 34 N., R. 88 W., and T. 32 N., R.

Kha HAREBELL FORMATION

Kfh FOX HILLS SANDSTONE

Kle LEWIS SHALE

Kc CODY SHALE

Ks STEELE SHALE

Km MEETEETSE FORMATION

Kmv MESAVERDE FORMATION

Kb BACON RIDGE SANDSTONE

Kn NIOBRARA FORMATION

Kf FRONTIER FORMATION

FORMATIONS

Js SUNDANCE FORMATION

Jkn Nugget sandstone

FORMATIONS

THE CHUGWATER FORMATION

TRPg GOOSE EGG FORMATION

through Permian)

PPc CASPER FORMATION

Kso SOHARE FORMATION

Klm LANCE FORMATION, FOX HILLS SANDSTONE, MEETEETSE

FORMATION, AND BEARPAW AND LEWIS SHALES—In the

Bighorn Basin consists of Lance. Meeteetse, and, in the southeastern part

tongue of Lewis Shale; in the northern part of the Wind River Basin, of

Lance and Lewis; on the west side of the Powder River Basin north of T.

45 N., of Lance, Fox Hills, and Bearpaw, and to the south, of Lance, Fox

Lance, Meeteetse, and Lewis, and, in the southeastern part of the basin, of

ORDOVICIAN

sands, silts, and basalts of The Narrows. **Qb** Mountain (age about 0.5 Ma), Qb

LOWER QUATERNARY AND TERTIARY ROCKS AND UNCONSOLIDATED SURFICIAL DEPOSITS

consolidated gravel above and flanking some major streams. QTg CONGLOMERATE Northwest Wyoming (Jackson Hole) (Pleistocene or Pliocene)—Paleozoic clasts, chiefly of Madison Limestone, in a lithified carbonate matrix. QTc Central (Medicine Bow Mountains) and east Wyoming (east of Laramie Mountains) (Pleistocene to Miocene)—Giant granite boulders in an arkose BUG FORMATION (PLEISTOCENE OR PLIOCENE)—Lacustrine white marl, claystone, sandstone, conglomerate, and tuff; generally radioactive.

TERTIARY SEDIMENTARY AND IGNEOUS ROCKS

INTRUSIVE AND EXTRUSIVE IGNEOUS ROCKS—Composition ranges from hornblende monzonite to basalt. In Yellowstone area includes andesite and basalt of Emerald Lake (age about 2 Ma), rhyolite of Broad Creek, Pliocene Junction Butte Basalt, and gravel of Mount Everts. Age of basalt on Crescent Mountain 3.6 Ma. Tii CALDWELL CANYON VOLCANICS—Dacitic volcanic rocks; obsidian gravel at base. **Tcv** SALT LAKE FORMATION—White, gray, and green limy tuff, siltstone,

CONANT CREEK TUFF (AGE ABOUT 5.8 Ma)—Lavender rhyolite welded

sandstone, and conglomerate. Tsl

tuff, and limestone. In thrust belt includes conglomerate. **Tte** conglomerate. **Tcd** and sandstone. **Tc**

11 Ma), Tbf MIOCENE ROCKS Southwest Wyoming

claystone of Miocene (?) age. Conglomerate of uncertain correlation locally Saratoga Valley and west and southwest to Colorado-White massive soft tuffaceous sandstone and lesser amounts of white marl; lower part conglomeratic. Underlies North Park Formation in Saratoga Valley. To the west and southwest is called Browns Park Formation. Tm Rawlins area—White massive soft tuffaceous sandstone. Tm Central Wyoming—White soft tuffaceous sandstone. Locally derived conglomerate in upper and lower parts of sequence; in places lower conglomeratic sequence may be of Oligocene age. In Granite Mountains K/Ar age of tuff in lower part of sandstone sequence about 17 Ma and

South end of Wind River Range—Siliceous, arkosic, and locally radioactive

Southwest Wyoming

Dolomite in Tps. 43 and 44 N., Rgs. 85 and 86 W. MD MADISON LIMESTONE AND DARBY FORMATION MDO MADISON LIMESTONE, DARBY OR THREE FORKS, JEFFERSON Formation. **Tmu** AND BEARTOOTH BUTTE FORMATIONS, AND BIGHORN DOLOMITE—Darby on west flank of Washakie Range; Beartooth Butte LOWER MIOCENE ROCKS only in Beartooth Mountains MO MADISON LIMESTONE AND BIGHORN DOLOMITE—East side of

Pzr MADISON LIMESTONE, DARBY FORMATION, BIGHORN FORMATION, AND FLATHEAD SANDSTONE—East of Wind River Canyon consists of Madison, Bighorn, and Cambrian rocks; in Rattlesnake Hills, east end of Granite Mountains, and north end of Laramie Mountains consists of Madison Limestone and Cambrian rocks DO THREE FORKS, JEFFERSON, AND BEARTOOTH BUTTE

FORMATIONS AND BIGHORN DOLOMITE BIGHORN DOLOMITE O€ BIGHORN DOLOMITE, GALLATIN LIMESTONE, GROS VENTRE FORMATION, AND FLATHEAD SANDSTONE **C**r GALLATIN LIMESTONE, GROS VENTRE FORMATION AND

EQUIVALENTS, AND FLATHEAD SANDSTONE

METASEDIMENTARY METAVOLCANIC ROCKS MIDDLE PROTEROZOIC EARLY PROTEROZOIC PROTEROZOIC AND LATE ARCHEAN LATE ARCHEAN EARLY ARCHEAN

PRECAMBRIAN ROCKS METASEDIMENTARY AND METAVOLCANIC ROCKS Xsv METASEDIMENTARY AND METAVOLCANIC ROCKS

METASEDIMENTARY ROCKS Libby Creek Group Xdl Deep Lake Group Wgn GRANITE GNEISS WVsv METASEDIMENTARY AND METAVOLCANIC ROCKS Metasedimentary rocks Metamorphosed mafic and ultramafic rocks

Ugn OLDEST GNEISS COMPLEX—Overprint pattern indicates

area of migmatite related to emplacement of 2,600 - Ma

PLUTONIC ROCKS Ys SHERMAN GRANITE LARAMIE ANORTHOSITE COMPLEX Yls Pyroxene and hornblende syenite Yla Anorthosite and norite

----- CONTACT

Yd RHYOLITE TO DIABASE PORPHYRY DIKES YX MAFIC INTRUSIVE ROCKS Xgy GRANITIC ROCKS OF 1,700 - Ma AGE GROUP Xqd QUARTZ DIORITE Xm MAFIC INTRUSIVE ROCKS Xgo GRANITIC ROCKS OF 2,000 - Ma AGE GROUP

PW MAFIC INTRUSIVE ROCKS Wp PERIDOTITE INTRUSIVE ROCKS Wg GRANITIC ROCKS OF 2,600 - Ma AGE GROUP Wgd GRANODIORITE OF THE LOUIS LAKE PLUTON Wqm QUARTZ MONZONITE OF NORTH YELLOWSTONE WVg PLUTONIC ROCKS

MAP SYMBOLS

FAULT-Dotted where concealed. Bar and ball on downthrown side. Includes shear zones as well as faults in Precambrian rocks in the Wind River Range, Medicine Bow Mountains, and Sierra Madre THRUST FAULT–Dotted where concealed. In some places the dotted line indicates where the fault intersects an unconformity between faulted strata below and unfaulted strata above; in other places it indicates where the shallower part of the fault disappears into bedding planes. Sawteeth on upper plate. Some thrust faults are deeply buried and are approximately located on the basis of seismic data and drilling THRUST FAULT WITH YOUNGER NORMAL FAULT ALONG SAME TRACE–Dashed where approximately located; dotted where concealed. Sawteeth on upper plate on thrust fault; bar and ball on

> emplacement between Triassic and Late Jurassic time (Karl See sheet 3 (back side of this sheet) for PRINCIPAL

> > REFERENCES CITED.

SOURCES OF GEOLOGIC DATA AND

DESCRIPTION OF STRATIGRAPHIC UNITS This description generally lists individual stratigraphic units in order of increasing age or from left to right as the map units appear in the correlation diagrams. Stratigraphic units may be included in one or more map units; such stratigraphic units are represented by the colors and letter symbols in the boxes below and by the letter symbols in the CORRELATION DIAGRAMS AND LIST OF MAP UNITS. Letter symbols following the description indicate which combinations have been made because of cartographic limitations. The list of map units shows all the combinations of stratigraphic units. System and series designations are given in the individual stratigraphic

QUATERNARY ROCKS AND UNCONSOLIDATED DEPOSITS ALLUVIUM AND COLLUVIUM—Clay, silt, sand, and gravel in flood plains, GRAVEL, PEDIMENT, AND FAN DEPOSITS—Mostly locally derived clasts. Includes some glacial deposits along east flank of Wind River GLACIAL DEPOSITS—Till and outwash of sand, gravel, and boulders. Qg LANDSLIDE DEPOSITS—Locally includes intermixed landslide and glacial DUNE SAND AND LOESS-Includes active and dormant sand dunes. In PLAYA LAKE AND OTHER LACUSTRINE DEPOSITS—Chiefly clay, UNDIVIDED SURFICIAL DEPOSITS—Mostly alluvium, colluvium, and glacial and landslide deposits. Primarily in Yellowstone area and Bighorn

BASALT FLOWS AND INTRUSIVE IGNEOUS ROCKS Yellowstone area—Includes Osprey, Madison River, Swan Lake Flat, and Falls River Basalts, basalts of Mariposa Lake, Undine Falls Basalt, and gravels, In and adjacent to Absaroka and Washakie Ranges-Includes basalt of Lava RHYOLITE FLOWS, TUFF, AND INTRUSIVE IGNEOUS ROCKS-Includes Plateau Rhyolite (age about 0.07 Ma) and interlayered sediments. Mount Jackson Rhyolite (age 0.6 to about 1 Ma), Lewis Canyon Rhyolite (age about 0.9 Ma); and Lava Creek Tuff of Yellowstone Group (age 0.6 to ALKALIC EXTRUSIVE AND INTRUSIVE IGNEOUS ROCKS (AGE 1.25 Ma)—Leucite- and nepheline-rich flows, scoria, and necks. Qi

TERRACE GRAVEL (PLEISTOCENE AND/OR PLIOCENE)—Parth

HUCKLEBERRY RIDGE TUFF OF YELLOWSTONE GROUP (AGE SLIGHTLY MORE THAN 2 Ma)—Lavender to gray-brown welded rhvolite tuff. **Thr** HEART LAKE CONGLOMERATE—Abundant gray limestone and dolomite clasts and sparse rhyolite and quartzite clasts in a talc and clay matrix. Thi SHOOTING IRON FORMATION—Greenish-gray to pink tuffaceous lacustrine and fluviatile claystone and siltstone, fine-grained sandstone, and conglomerate. **Tsi**

TEEWINOT FORMATION (AGE ABOUT 9 Ma)—White lacustrine clay, CAMP DAVIS FORMATION—Upper 5,000 ft chiefly red conglomerate and red claystone; underlain by white tuff, limestone, claystone, and basal gray COLTER FORMATION—Dull-green and gray tuff, volcanic conglomerate, RED CONGLOMERATE ON TOP OF HOBACK AND WYOMING RANGES (MIOCENE?; MAY BE AS OLD AS EOCENE)—Locally derived clasts of Mesozoic and Paleozoic rocks in a red clay and sand

BASALT FLOWS AND INTRUSIVE IGNEOUS ROCKS (AGE ABOUT Southern Rock Springs uplift—Pale-green to tan tuffaceous sandstone and

fission-track age of lower conglomerate about 24 Ma. **Tm** UPPER MIOCENE ROCKS²

sandstone, claystone, and conglomerate. Fission-track age about 27 Ma. Recent work suggests that part of these deposits may be of Eocene age. Pliocene and Miocene (as originally defined 2) South Pass Formation. **Tmu** Saratoga Valley-White to greenish-gray tuffaceous sandstone, siltstone, and claystone; locally conglomeratic. North Park Formation. **Tmu** Central Wyoming—Arkosic sandstone, conglomerate, and siltstone; some lightcolored tuffaceous radioactive claystone and white cherty limestone. Tmu North of Sweetwater River in Granite Mountains-Light-colored tuffaceous radioactive claystone, siltstone, sandstone, and arkose. Moonstone East Wyoming-Light-colored tuffaceous claystone, sandstone, and conglomerate. Ogallala Formation in Denver Basin. Tmu

Northwest Wyoming (Bighorn Mountains)—Gray soft poorly bedded to massive sandstone. Tml Central Wyoming—Tuffaceous sandstone, siltstone, and white marl. Tml Miocene and upper Oligocene

LOWER MIOCENE AND UPPER OLIGOCENE ROCKS—Light-colored soft porous sandstone and underlying white tuffaceous claystone and siltstone. Arikaree Formation in Denver Basin. Tmo ROCKS EQUIVALENT TO UPPER AND LOWER MIOCENE ROCKS AND WHITE RIVER FORMATION—Light-colored sandstone, white tuffaceous blocky claystone, and siltstone. Black Hills. **Tmo** Tu Post-Eocene

SANDSTONE AND CONGLOMERATE—Gray hard coarse-grained sandstone and conglomerate. **Tu**

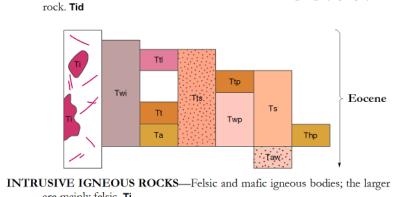
BISHOP CONGLOMERATE—Clasts of red quartzite, gray chert, and WHITE RIVER FORMATION (AGE 31 TO 35 Ma)—White to pale-pink blocky tuffaceous claystone and lenticular arkosic conglomerate. Twr Upper conglomerate member—Light-gray soft conglomeratic tuffaceous sandstone and conglomerate of Precambrian clasts. Twru

Brule Member—Pale-pink to white blocky tuffaceous claystone and lenticular

sandstone. Locally includes the upper conglomerate member. Twrb

Chadron Member—Light-gray to dark-red tuffaceous claystone, sandstone, and lenticular conglomerate. Twrc Pliocene(?)
and Eocene FOWKES FORMATION—Light-colored tuffaceous sandstone and siltstone, locally conglomeratic. Locally designated by some as Norwood Tuff. **Tf**

OLIGOCENE AND (OR) UPPER AND MIDDLE EOCENE ROCKS-Light-gray tuff, arkosic sandstone, and lenticular conglomerate. **Toe** DACITE AND QUARTZ LATITE INTRUSIVE AND EXTRUSIVE IGNEOUS ROCKS (AGE ABOUT 44 Ma)—Light-gray porphyritic



THOROFARE CREEK GROUP (AGE 44 TO 49 Ma)—Light-colored volcaniclastic strata, andesite lava flows, and dark-brown breccia. **Tts** Wiggins Formation (age 44-47 Ma)—Light-gray volcanic conglomerate and white tuff, containing clasts of igneous rocks. Twi Two Ocean and Langford Formations (age 47-48 Ma)—Dark-colored andesitic volcaniclastic rocks and flows underlain by light-colored andesitic tuffs and flows. **Ttl, Tts** Герее Trail Formation (age probably about 48 Ma)—Green and olivedrab hard generally well bedded andesitic conglomerate, sandstone, and Aycross Formation (age 49 Ma)—Brightly variegated bentonitic claystone and tuffaceous sandstone, grading laterally into greenish-gray sandstone and claystone. In and east of Jackson Hole contains gold-bearing SUNLIGHT GROUP. Ts, Tts Trout Peak Trachyandesite. Ttp, Ttl, Tts, Ts

Wapiti Formation—Andesitic volcaniclastic rocks. **Twp, Tts, Ts** Crescent Hill Basalt. **Ts** Mount Wallace Formation—Felsic and mafic volcaniclastic rocks. Ts HOMINY PEAK FORMATION (AGE ABOUT 49 Ma)—Mafic volcaniclastic conglomerate and tuff; sparse claystone in upper part; gold-bearing quartzite conglomerate at base. **Thp** WASHBURN GROUP. Taw Sepulcher Formation—Andesitic and dacitic volcaniclastic rocks. Taw Lamar River Formation—Andesitic lava and volcaniclastic rocks. **Taw** Cathedral Cliffs Formation—Light-colored andesitic volcaniclastic rocks.

ICE POINT CONGLOMERATE—Reddish-brown conglomerate, chiefly of Paleozoic rock fragments. Tip WASHAKIE FORMATION (AGE ABOUT 43 TO 44 Ma)—Gray, green,

tan, and dull-red tuffaceous arkosic sandstone and claystone. Twa WAGON BED FORMATION (AGE ABOUT 45 TO 49 Ma) Southwest and central Wyoming—Green and gray tuffaceous claystone, sandstone, and conglomerate; some uranium-phosphate marlstone and variegated bentonitic claystone. Locally contains oil shale between Wind River and Bighorn Basins. Twb Central Wyoming (west side of Laramie Mountains)—Dull-green siliceous bentonitic claystone and tuff; giant granite boulder conglomerate in tuffaceous matrix. **Twb**

BRIDGER FORMATION—Greenish-gray, olive-drab and white tuffaceous sandstone and claystone; lenticular marlstone and conglomerate. Tb CROOKS GAP CONGLOMERATE—Giant boulders of granite in arkosic sandstone matrix. Reynolds (1976) considers age of eastern exposures to

FRONTIER FORMATION

and coal. **Kss**

at top. **Kmt, Kft, Knt**

some bentonite and coal. **Kns**

Thrust belt—White to brown sandstone and dark-gray shale; oyster coquina in

Northern Yellowstone area—Yellowish- to medium-gray sandstone; tuffaceous

containing numerous bentonite beds and thin lenticular sandstone. Ks,

North and south Wyoming—Gray sandstone and sandy shale. Kf, Kcf, Knt, Kft

STEELE SHALE (AGE ABOUT 78 TO 82 Ma)—Gray soft marine shale

PIERRE SHALE (AGE 72 TO 78 Ma)—Dark-gray concretionary marine

NIOBRARA FORMATION (AGE ABOUT 83 Ma)—Light-colored

limestone and gray to yellow speckled limy shale. Kn, Ksn, Knt, Knc

CARLILE SHALE—Dark-gray sandy shale; Sage Breaks Member at top; Turner

GREENHORN FORMATION—Light-colored limestone, marl, and limy sandstone interbedded with gray concretionary shale. **Kgb Kgbm** BELLE FOURCHE SHALE—Black soft bentonitic concretionary shale. Kgb,

WAYAN FORMATION—Variegated mudstone, siltstone, and sandstone. Kws

SAGE JUNCTION FORMATION—Gray and tan siltstone and sandstone.

COKEVILLE FORMATION—Tan sandstone, claystone, limestone, bentonite,

SMITHS FORMATION—Ferruginous black shale and tan to brown sandstone

thin bentonite beds, and quartzitic sandstone. **Ka**

thin limestone, and bentonite beds. Kbr

SKULL CREEK SHALE—Black soft fissile shale. Kns

ASPEN SHALE—Light- to dark-gray siliceous tuffaceous shale and siltstone,

BEAR RIVER FORMATION—Black shale, fine-grained brown sandstone,

MOWRY SHALE (AGE 94 TO 98 Ma)—Silvery-gray hard siliceous shale

THERMOPOLIS SHALE—Black soft fissile shale; Muddy Sandstone Member

NEWCASTLE SANDSTONE—Gray sandstone and sandy shale containing

GANNETT GROUP—Red sandy mudstone, sandstone, and chert-pebble

claystone. Includes Fall River and Lakota Formations. KJ

Northern Yellowstone area—Variegated silty claystone and fine-grained

North Wyoming—Dully variegated claystone, nodular limestone, and gray silty

South Wyoming—Dully variegated siliceous claystone, nodular white limestone,

Northeast Wyoming—Dully variegated siliceous claystone, nodular white

STUMP FORMATION—Glauconitic siltstone, sandstone, and limestone. Jst

Swift Formation—Calcareous glauconitic sandstone and sandy limestone. **KJk**

Rierdon Formation—Mudstone, siltstone, shale, and basal limestone. KJk

SUNDANCE FORMATION—Greenish-gray glauconitic sandstone and shale,

I'WIN CREEK LIMESTONE—Greenish-gray shaly limestone and limy

GYPSUM SPRING FORMATION—Interbedded red shale, dolomite, and

siltstone. Includes Gypsum Spring Member. Jst

underlain by red and gray nonglauconitic sandstone and shale. KJs, KJg,

is not certainly present. KJ, KJs, KJg, KR, MzPz

and gray silty sandstone. KJ, KJs, MzPz

limestone, and gray silty sandstone. **KJ**

Sawtooth Formation—Red beds and limestone. KJk

K൹, Js, Jsg, J൹, MzPz

sandstone. In southern Yellowstone and Jackson Hole areas the Morrison

conglomerate; thin limestone and dark-gray shale in upper part, more

conglomeratic in lower part. Includes Smoot Formation (red mudstone

containing abundant fish scales and bentonite beds. Kmt, Knt, Kgbm, Kft,

OUEALY FORMATION—Variegated mudstone and tan sandstone. Kss

upper part; coal and lignite in lower part. **Kf**

and carbonaceous in lower part. **Kft**

shale; contains several bentonite beds. **Kp**

Sandy Member in middle. Kcl. Knc

VOLCANIC CONGLOMERATE—Dark-brown to black conglomerate, poorly bedded, composed chiefly of basalt clasts in a basaltic tuff matrix. **Tv** ALKALIC INTRUSIVE AND EXTRUSIVE IGNEOUS ROCKS (AGE ABOUT 44 Ma)—Light-to greenish-gray porphyry. Tai

GREEN RIVER FORMATION Thrust belt—Buff laminated marlstone and limestone, brown oil shale, and siltstone. Includes Angelo and Fossil Butte Members. **Tgrw** Southwest Wyoming-Oil shale, light-colored tuffaceous marlstone, and sandstone. **Tgrw** Laney Member (age probably about 45 Ma)—Oil shale and marlstone. Tgl Wilkins Peak Member (age about 45 Ma)—Green, brown, and gray tuffaceous sandstone, shale, and marlstone; contains evaporites in subsurface sections. Tgw, Tgwt Tipton Shale Member or Tongue—Oil shale and marlstone. **Tgt, Tgwt** Fontenelle Tongue or Member-Oil shale, marlstone, limestone, and siltstone; occurs along Green and New Fork Rivers and on west side of Green River Basin from T. 33 N. south to and lensing out in T. 17 N. Twg Luman Tongue—Oil shale, carbonaceous shale, and sandstone. **Tglu**

GRANITIC CONGLOMERATE ABOVE OR IN UPPER PART OF

WASATCH FORMATION—Giant granite boulders in arkosic

sandstone matrix. Occurs along west margin of Wind River Range. Tgc

Main body—Drab sandstone, drab to variegated claystone and siltstone;

WASATCH FORMATION Thrust belt—Variegated mudstone and sandstone. Includes Tunp and Bullper Members, other tongues and unnamed members, and main body. Tgrw Diamictite and sandstone—Diamictite grades laterally into other members of the formation. **Twd** Main body-Variegated red to gray, brown, and gray mudstone and sandstone; conglomeratic lenses. Tw Southwest Wyoming—Drab to variegated claystone and siltstone, carbonaceous shale and coal, buff sandstone, arkose, and conglomerate. In northwestern part of Green River Basin is thick arkosic light-yellowish-tan sandstone intertonguing with pale-green to gray claystone and shale. Tw Cathedral Bluffs Tongue—Variegated claystone and lenticular sandstone; conglomeratic near south margin of Wind River Range. Two New Fork Tongue—Dull-red and green mudstone, brown sandstone, and thin limestone beds, merging southward in T. 23 N. with other units. Twg Niland Tongue—Brown sandstone, carbonaceous shale, and coal. Twn

locally derived conglomerate around basin margins. Lower part is and siltstone), Draney Limestone, Bechler Conglomerate, Peterson Limestone, and Ephraim Conglomerate. Upper Jurassic fossils have been La Barge and Chappo Members—Red, gray, and brown mudstone and reported from the Ephraim. **Kg** conglomerate and yellow sandstone. La Barge Member tongues out to KOOTENAI FORMATION—Rusty thin-bedded sandstone, grayish-red soft north at about T. 35 N. Lower part of Chappo is Paleocene. Twic claystone, white limestone, and chert-pebble conglomerate. KJk East Wyoming—Drab sandstone and drab to variegated claystone; numerous CLOVERLY FORMATION coal beds in lower part. **Tw** North and south Wyoming—Rusty sandstone at top, underlain by brightly Moncrief Member—Conglomerate of Precambrian clasts, interbedded with variegated bentonitic claystone; chert-pebble conglomerate locally at base. drab sandstone and claystone. **Twmo** KJ, KJs, KJg, KT, MzPz Kingsbury Conglomerate Member—Conglomerate of Paleozoic clasts, Northeast Wyoming—Rusty to light-gray sandstone containing lenticular cher interbedded with drab sandstone and variegated claystone. Twk pebble conglomerate interbedded with variegated bentonitic claystone. KJ TRANSITIONAL UNIT BETWEEN BATTLE SPRING AND INYAN KARA GROUP—Rusty to light-gray sandstone containing lenticular

WASATCH FORMATIONS—Contains interbedded lithologies of Battle Spring and Wasatch Formations. **Tbw** BATTLE SPRING FORMATION—Equivalent to, and lithologically similar to locally derived basin-margin conglomerate of Wasatch Formation; merges southward into main body of Wasatch Formation. Lower part is

PASS PEAK FORMATION AND EQUIVALENTS—Includes Lookout Mountain Conglomerate Member of Wasatch Formation. On south side of Gros Ventre Range consists of gold-bearing quartzite conglomerate; intertongues southward with sandstone and claystone of main body of Wasatch Formation. Tp MIDDLE AND LOWER EOCENE ROCKS-Equivalent to Aycross and Wind River Formations. Tem CRANDALL CONGLOMERATE—Nonvolcanic conglomerate containing clasts of Lower Paleozoic rocks. Tcr WIND RIVER FORMATION Northwest Wyoming (Jackson Hole)—Variegated red and white claystone and

gray and black shale and many coal beds. Tftr, Tftl

 ${\bf EVANSTON}\ {\bf FORMATION} \\ -- {\bf Gray}\ siltstone,\ sparse\ red\ sandstone,\ and\ lignite$

PINYON CONGLOMERATE—Brown gold-bearing quartzite conglomerate

SEDIMENTARY ROCKS—Northern part of Wind River Basin. White-

FERRIS FORMATION—Brown and gray sandstone and shale; sparse

INTRUSIVE IGNEOUS ROCKS—Gray to buff monzonite porphyry. Ki

MESOZOIC AND PALEOZOIC SEDIMENTARY ROCKS

LANDSLIDE CREEK FORMATION—Greenish-gray bentonitic tuffaceous

HAREBELL FORMATION—Gold-bearing quartzite conglomerate, olive-drab

North Wyoming—Thick-bedded buff sandstone and drab to green shale; thin

South and northeast Wyoming—Brown and gray sandstone and shale; thin coal

MEDICINE BOW FORMATION—Brown and gray sandstone and shale; thin

FOX HILLS SANDSTONE—Light-colored sandstone and gray sandy shale

MEETEETSE FORMATION (AGE ABOUT 73 Ma)—Chalky-white to gray

LEWIS SHALE (AGE ABOUT 68 Ma)—Gray marine shale containing many

BEARPAW SHALE—Dark-greenish-gray shale containing thin gray sandstone

ADAVILLE FORMATION—Gray sandstone, siltstone, and carbonaceous

siltstone, claystone, coal, and bentonite. Kbb

thin coal beds. Kso, Ksb

Parkman Sandstone Member. Kmv

coal, and carbonaceous shale. **Kal**

conglomerate in upper part. **Ke**

numerous coal beds. **Kr**

and carbonaceous shale. **Kmv**

CODY SHALE (AGE 78 TO 83 Ma)

gray sandstone. **Kc, Kcf**

MESAVERDE GROUP (SOUTH WYOMING)

claystone; conglomeratic in upper part; coal-bearing in lower part. Kav

HILLIARD SHALE—Dark-gray to tan claystone, siltstone, and sandy shale. Kh

BLIND BULL FORMATION—Gray to tan conglomeratic sandstone,

EVERTS FORMATION, EAGLE SANDSTONE, AND TELEGRAPH

SOHARE FORMATION—Lenticular gray and brown sandstone and shale;

BACON RIDGE SANDSTONE—Gray to tan marine sandstone and thick coal

beds; gold-bearing quartzite conglomerate in lower part. Kb, Ksb MESAVERDE FORMATION—Light-colored massive to thin-bedded

CREEK FORMATION—Massive to thin-bedded sandstone, mudstone,

sandstone, gray sandy shale, and coal beds. In Jackson Hole locally

contains gold-bearing quartzite conglomerate. North of North Fork

Powder River east of the Bighorn Mountains, consists solely of the

Almond Formation—White and brown soft sandstone, gray sandy shale,

Ericson Sandstone—White massive sandstone; lenticular chert-grit

Rock Springs Formation—White to brown sandstone, shale, and claystone;

Almond Formation—White and brown soft sandstone, gray sandy shale, coal

Blair Formation—Drab-yellow and brown sandstone and sandy shale. Kbl

Pine Ridge Sandstone—Light-gray sandstone and thin coal beds. **Kmv**

Pine Ridge Sandstone—Light-gray sandstone and thin coal beds. Kmv

BAXTER SHALE—Gray to black soft sandy shale and shaly sandstone. Kba

North and south Wyoming—Dull-gray shale, gray siltstone, and fine-grained

Rock River Formation—Soft sandstone and sandy shale. **Kmv**

Northern Yellowstone area—Gray to brown shale and siltstone. **Kc**

Allen Ridge Formation—Gray sandstone, shale, and thin coal beds. Kmv

Haystack Mountains Formation—Gray marine sandstone and shale. **Kmv**

sandstone, vellow, green, and dark-gray bentonitic claystone, white tuff,

gray and brown lenticular concretion-rich sandstone beds. Kle, Klm, Kfl,

sandstone and conglomerate. Klc

conglomerate lenses. KI, KIm

and carbonaceous shale beds. KI

and thin coal beds. Km, Klm, Kml

coal and carbonaceous shale beds. **Kmb**

containing marine fossils. Kfh, Kfl, Kfb, Klm

LANCE FORMATION

sandstone, and green claystone. **Kha**

weathering oil-stained sandstone and brown carbonaceous shale. TKu

carbonaceous shale and coal beds; thin lenses of pebble conglomerate. **TKf**

interbedded with brown and gray sandstone. Age of basal part about 67

Ma in northeastern Jackson Hole; farther south entire sequence is

and thin coal beds. Tft, Tflt

siltstone; largely nontuffaceous except near the top; lenticular coal unit in middle. At base locally includes equivalent of Indian Meadows Formation. Central Wyoming—Variegated claystone and sandstone; lenticular conglomerate. Age of tuff at top 49 Ma. Twdr, Twim INDIAN MEADOWS FORMATION—Red to variegated claystone, sandstone, and algal-ball(?) limestone; some beds of large Paleozoic boulders and detachment masses of Paleozoic and Mesozoic rocks. Tim, TATMAN FORMATION-Drab nontuffaceous claystone, oil shale, lignite,

and sandstone. **Tta** WILLWOOD FORMATION-Variegated claystone, shale, and sandstone; some lenticular gold-bearing quartzite conglomerate. **Twl** INTRUSIVE AND EXTRUSIVE IGNEOUS ROCKS (CHIEFLY EOCENE; AGE OF INTRUSIVES ABOUT 53 TO 55 Ma)— Incorporates masses of Mississippian through Cambrian formations. Confined to Black Hills. **Tie** PREUSS SANDSTONE OR REDBEDS—Purple, maroon, and reddish-gray sandy siltstone and claystone; contains salt and gypsum in thick beds in

Gypsum. In north Wyoming wedges out south in T. 39 N. KJg, KT, Jsg, CONGLOMERATE OF SUBLETTE RANGE (EOCENE AND JŘ, JRgn, JRgc, MzPz PALEOCENE)—Locally derived indurated angular conglomerate. Tcs CONGLOMERATE OF ROARING CREEK (EOCENE OR PALEOCENE; OLDER THAN MAIN PART OF WASATCH FORMATION)—Red and gray conglomerate containing clasts of Mesozoic, Paleozoic, and Precambrian rocks. Tep COALMONT FORMATION (EOCENE AND PALEOCENE)—Tan to gray arkosic micaceous soft sandstone, claystone, and locally derived conglomerate. **Tco** NUGGET SANDSTON Thrust belt—Buff to pink crossbedded well-sized and well-sorted quartz sandstone and quartzite; locally has oil and copper-silver-zinc

Upper Cretaceous

North Wyoming—Gray to dull-red crossbedded quartz sandstone. KR, JRn, JЋ, JЋgn, JЋnd JЋgc South Wyoming—Gray to dull-red massive to coarsely crossbedded quartz sandstone. MzPz HOBACK FORMATION—Interbedded drab and grav sandstone and claystone. Locally contains thick red and gray conglomerate. **Th DEVILS BASIN FORMATION**—Light-gray sandstone interbedded with green and gray claystone; sparse coal and carbonaceous shale. **Tdb** HANNA FORMATION—Brown and gray sandstone, shale, conglomerate, and coal.; giant quartzite boulders near Medicine Bow Mountains. **Tha** JELM FORMATION—Red sandstone. Tc, TPjs FORT UNION FORMATION Northwest, southwest, and central Wyoming—Brown to gray sandstone, gray to black shale, and thin coal beds. **Tfu** East Wyoming-Light-colored massive sandstone, drab shale, and thick coal

Tongue River Member—Thick beds of yellow sandstone interbedded with Lebo Member—Dark-gray clay shale and concretionary sandstone. Tfl, Tftl, ANKAREH FORMATION—Red and maroon shale and purple limestone Tullock Member—Soft gray sandstone, gray and brown carbonaceous shale, CHUGWATER FORMATION—Red siltstone and shale. Alcova Limestone Member in upper middle part in north Wyoming. Thin gypsum partings near base in north and northeast Wyoming. JRnd, JRgc, Rc, Rcd, RPcg CHUGWATER GROUP OR FORMATION (SOUTH WYOMING)—Red LOWER TERTIARY AND UPPERMOST CRETACEOUS shale and siltstone containing thin gypsum partings near base. Group SEDIMENTARY AND IGNEOUS ROCKS includes Popo Agie Formation (red shale and red, yellow, and purple siltstone; lenses of lime-pellet conglomerate). Crow Mountain Sandstone (red and gray, thick bedded), Alcova Limestone, and Red Peak Formation

mineralization. Jkn, Jknd

the units listed above. **Tc, TPcg, TPjs, MzPz**

THAYNES LIMESTONE—Gray limestone and limy siltstone. J knd, kad WOODSIDE SHALE—Red siltstone and shale. Jknd, kad DINWOODY FORMATION Thrust belt—Gray to olive-drab dolomitic siltstone. Jknd, kad Northern Yellowstone area—Olive-drab dolomitic siltstone and green shale. North Wyoming—Olive-drab hard dolomitic thin-bedded siltstone. JRnd, Rcd,

SPEARFISH FORMATION—Red shale, red siltstone, and white gypsum beds; gypsum beds especially abundant near base. **FPs**

GOOSE EGG FORMATION—Red sandstone and siltstone, white gypsum, halite, and purple to white dolomite and limestone. RPg, RPcg, MzPz

PHOSPHORIA FORMATION AND RELATED ROCKS Thrust belt—Upper part is dark- to light-gray chert and shale with black shale and phosphorite at top; lower part is black shale, phosphorite, and cherty Northern Yellowstone area—Brown sandstone and dolomite, cherty phosphatic and glauconitic dolomite, phosphatic sandstone and dolomite, and greenish-gray to black shale. Intertonguing equivalent is Shedhorn Sandstone, PIPMa North Wyoming-Brown sandstone and dolomite, cherty phosphatic and glauconitic dolomite, phosphatic sandstone and dolomite, and greenishgray to black shale. Intertonguing equivalents of parts of Phosphoria are Park City Formation (primarily cherty dolomite, limestone, and phosphatic gray shale) and Shedhorn Sandstone. Pp, PPMa, MzPz

FORELLE LIMESTONE—Thin-bedded limestone. Locally is a member of the Goose Egg Formation. **RPjs**, **Pfs** SATANKA SHALE—Red shale. Trpjs, Pfs MINNEKAHTA LIMESTONE—Gray slabby hard limestone. Locally is a member of the Goose Egg Formation. Pmo, Pzr OPECHE SHALE—Red soft sandy shale. Locally is a member of the Goose

CASPER FORMATION—Gray, tan, and red thick-bedded sandstone underlain by interbedded sandstone and pink and gray limestone. May include some Devonian (?) sandstone along east flank of Laramie Mountains. PPc, PPcf, ΓENSLEEP SANDSTONI

North Wyoming—White to gray sandstone containing thin limestone and dolomite beds. Permian fossils have been found in the topmost beds of the Tensleep at some localities in Washakie Range, Owl Creek Mountains, and southern Bighorn Mountains. PPMa, PM, MzPz South Wyoming—White to gray sandstone containing thin limestone and Lower Permian

WELLS FORMATION—Gray limestone interbedded with yellow limy sandstone. **PPMa**, **PPM** HARTVILLE FORMATION—Red and white sandstone underlain by gray dolomite and limestone, red shale, and red and gray sandstone. Lowermost unit may be Late Mississippian in age. PPh MINNELUSA FORMATION—Buff and red limy sandstone; some thin limestone beds, solution breccias, and gypsum. PPm, Pzr

Middle OUADRANT SANDSTONE—Light-gray sandstone. PPMa FOUNTAIN FORMATION—Arkose and red sandstone. PPcf

Middle and Lower

AMSDEN FORMATION Thrust belt—Red and gray cherty limestone and shale, sandstone, and conglomerate. PPMa, PPM Northern Yellowstone area—Red and green dolomitic shale, siltstone, and North Wyoming—Red and green shale and dolomite; at base is brown sandstone. PPMa, PM, MzPz South Wyoming—Red and green shale and dolomite; at base is persistent red to brown sandstone. PM, MzPz

Geologic Map of Wyoming

MADISON LIMESTONE OR GROUP—Group includes Mission Canyon

Limestone (blue-gray massive limestone and dolomite), underlain by Lodgepole Limestone (gray cherty limestone and dolomite). PPM, Mm,

PAHASAPA LIMESTONE—Gray massive dolomitic limestone. Pzr, MDe

dolomite. Locally includes unnamed dolomite and sandstone of Devonian ENGLEWOOD LIMESTONE—Pink slabby dolomitic limestone. MDe, Pzr

DARBY FORMATION—Yellow and greenish-gray shale and dolomitic

GUERNSEY FORMATION—Blue-gray massive cherty limestone and

siltstone underlain by fetid brown dolomite and limestone. MD, MDO, Pzr THREE FORKS FORMATION Northern Yellowstone area—Pink, yellow, and green dolomitic siltstone and North Wyoming—Yellow and greenish-gray shale and dolomitic siltstone. IEFFERSON FORMATION Northern Yellowstone area—Massive siliceous dolomite, MD, DO

North Wyoming—Fetid brown dolomite and limestone. MDO, DO

BEARTOOTH BUTTE FORMATION—Red sandstone, limy siltstone, and limestone. Occurs only in the Beartooth Mountains. MDO, DO

SI Upper and Middle Silurian

dolomite. SI WHITEWOOD DOLOMITE—Buff massive fossiliferous dolomite. O€, Pzr

BIGHORN DOLOMITE Northern Yellowstone area—Light-gray massive siliceous dolomite. **DO, O€** Thrust belt and north Wyoming—Grav massive cliff-forming siliceou dolomite and locally dolomitic limestone. MDO, MO, DO, Ob, O€, Pzr

chert-pebble conglomerate interbedded with variegated bentonitic WINNIPEG FORMATION—Pink to yellow siltstone and shale. O€, P

> Ordovician Cambrian DEADWOOD FORMATION—Red and brown quartzitic sandstone. O€, Pzr

Snowy Range Formation—Medium-gray limestone and underlying greenishgray shale. **OC** ilgrim Limestone—Blue-gray and yellow mottled hard limestone. 🗨 GALLATIN LIMESTONE OR GROUP Thrust belt—Gray and tan limestone. **0€**

GROS VENTRE FORMATION

Thrust belt—Greenish-gray micaceous shale. **0€**

North Wyoming—Blue-gray and yellow mottled hard dense limestone. OC, Cr,

Park Shale Member), underlain by blue-gray and yellow mottled hard dense limestone (Middle Cambrian Death Canyon Limestone Member), and soft green micaceous shale (Middle Cambrian Wolsey Shale Member). CAMBRIAN ROCKS—South Wyoming South flank of Granite Mountains—Blue-gray and yellow mottled hard dense limestone interbedded with soft green micaceous shale; dull-red quartzitic sandstone at base. **€r, Pzr** On and south of Rawlins uplift—Glauconitic quartzitic sandstone. **Cr, Pzr**

North Wyoming—Soft green micaceous shale (Upper and Middle Cambrian

PARK SHALE—Green micaceous soft shale. Upper part may be Late Cambrian MEAGHER LIMESTONE—Blue-gray and yellow mottled hard limestone. Of WOLSEY SHALE—Green micaceous soft shale. **○€** FLATHEAD SANDSTONE—Dull-red quartzite sandstone.

North Wyoming. O€, €r, Pzr PALEOZOIC INTRUSIVE ROCKS) Devonian and Devonian(?)

KIMBERLITE PIPES AND INTRUSIVES IN DIATREMES-Massive porphyritic to brecciated intrusive masses and dikes. Several diatremes contain diamonds, xenoliths of Silurian and Ordovician limestones and dolomites, fragments of Precambrian crystalline rocks, and xenoliths of peridotite, westerite, and eclogite. PRECAMBRIAN ROCKS

SHERMAN GRANITE (AGE 1,415 TO 1,435 Ma)—In Medicine Bow and Laramie Mountains. Ys LARAMIE ANORTHOSITE COMPLEX—In Laramie Mountains Pyroxene and hornblende syenite—Age 1,435 Ma. Yls Anorthosite and norite. Yla RHYOLITE TO DIABASE PORPHYRY DIKES (1,400 Ma). Yd

Middle and Early Proterozoic MAFIC INTRUSIVE ROCKS—Teton Range. YX

METASEDIMENTARY AND METAVOLCANIC ROCKS Sierra Madre-Granite gneiss, felsic gneiss, amphibolite, and metavolcanic Medicine Bow Mountains-Granite gneiss, felsic gneiss, amphibolite, hornblende gneiss, and amphibolite. **Xsv** Laramie Mountains—Pelitic schist, marble, granite gneiss, layered amphibolite, and felsic gneiss. **Xsv**

METASEDIMENTARY ROCKS-In Medicine Bow Mountains and Sierra Libby Creek Group 3—Pelitic schist, amphibole schist, quartzite, diamictite, quartz-pebble conglomerate, and marble. **XIc** Deep Lake Group 3—Quartzite, diamictite, pelitic schist, and quartz-pebble conglomerate. Xdl GRANITIC ROCKS OF 1,700-Ma AGE GROUP. Xgy OUARTZ DIORITE Sierra Madre—Encampment river Granodiorite 4; age 1,800 Ma. Xqd Medicine Bow Mountains—Keystone Quartz Diorite 5. Xqd

Black Hills—Pelitic schist; includes minor amounts of granite and amphibolite.

Hartville uplift—Diorite of Twin Hills 6. Xqd MAFIC INTRUSIVE ROCKS Sierra Madre—Gabbro of Elkhorn Mountain; age 1,800 Ma. Xm Medicine Bow Mountains—Mullen Creek 5 and Lake Owens 7 Mafic Complexes; older than 1,700 Ma. Xm GRANITIC ROCKS OF 2,000-Ma AGE GROUP Medicine Bow Mountains—Gaps Intrusion 3 (granitic). **Xgo** Hartville uplift—Granite and quartz monzonite of Flattop Butte 6; age 2,150 ±

Late Archean MAFIC INTRUSIVE ROCKS. PW

GRANITE GNEISS (AGE 2,600 TO 3,100 + Ma)—Layered to massive, locally

migmatitic; metasedimentary and metavolcanic rocks locally common. Includes Webb Canyon Gneiss in Teton Range. Wgn hornblende gneiss, biotite gneiss, quartzite, iron-formation, metaconglomerate, marble, and pelitic schist; locally preserved textures and structures suggest origin to be sedimentary or volcanic. Older than 2,875 Ma in Teton Range; older than 3,200 Ma in Granite Mountains; older than 2,600 Ma in Medicine Bow Mountains and Sierra Madre, where it is the Late Archean Phantom Lake Metamorphic suite 3. WVsv Wind River Range—Metagraywacke, pelitic schist, metaconglomerate, graphitic schist, and iron-formation; local meta-andesite. At least 2,800

quartzite, and iron-formation. **Ws** Casper Mountain (northwest extension of Laramie Mountains)—Felsic gneiss, quartzite, and iron-formation. Ws Laramie Mountains-Pelitic schist, iron-formation, quartzite, marble, metaconglomerate, and metagraywacke. **Ws** etamorphosed mafic and ultramafic rocks Gros Ventre Range—Hornblende gneiss and serpentinite. Wmu Wind River Range—Pillowed amphibolite, metagabbro, and ultramafic sills.

Wind River Canyon (cutting through Owl Creek Mountains)—Amphibolite and felsic gneiss of volcanic origin. Older than 2,700 Ma. **Wmu** Bighorn and Granite Mountains—Amphibolite. **Wmu** Seminoe Mountains—Amphibolite of volcanic origin, komatiite, and Casper Mountain—Amphibolite and serpentinite. Wmu Laramie Mountains—Amphibolite of volcanic origin, komatiite (?), metagabbro, and ultramafic sills. Wmu

PERIDOTITE INTRUSIVE ROCKS—In Laramie Mountains. Wp GRANITIC ROCKS OF 2,600-Ma AGE GROUP Yellowstone National Park—Granite. **Wg** Teton Range-Mount Owen Quartz Monzonite. Age 2,500 ± Ma; may be of Early Proterozoic age. **Wg** Gros Ventre and Washakie Ranges—Granitic rocks. Wg Owl Creek, Granite, and Seminoe Mountains, Rawlins uplift, and Medicine Bow mountains—Granite. **Wg** Wind River Range—Granodiorite to porphyritic and equigranular granite. **Wg** Sierra Madre—Granite and granodiorite. **Wg**

Laramie Mountains-Granite, amphibolite, and minor amounts of metasedimentary rocks. **Wg** Hartville uplift—granite and quartz monzonite. **Wg** ack Hills uplift—Granite and minor amounts of metasedimentary rocks. **Wg** GRANODIORITE OF THE LOUIS LAKE PLUTON (AGE 2,640 Ma)-Equigranular; locally gneissic. Wgd QUARTZ MONZONITE OF NORTHERN YELLOWSTONE (AGE 2,740 Ma). Wqm PLUTONIC ROCKS

Early
Archean

OLDEST GNEISS COMPLEX—Chiefly layered granitic gneiss, locally migmatitic. Local masses of quartzite, metagraywacke, iron-formation, and other metasedimentary rocks and amphibolite and felsic gneiss thought to be volcanic; metasedimentary rocks in Beartooth Mountains contain detrital zircon dated at more than 3,400 Ma. Inclusions show evidence of granulite-facies metamorphism prior to 2,800 Ma. Mueller and others (1982) suggest that large areas in Beartooth Mountains were invaded by Late Archean granite (age about 2,800 Ma). Bighorn Mountains—Dates of metamorphism 3,000 + Ma. Ugn Vind River Range—Includes large bodies of metagabbro. Overprint pattern indicates area of migmatite related to emplacement of 2,600-Ma granite.

Proterozoic and

METASEDIMENTARY AND METAVOLCANIC ROCKS—Amphibolit Metasedimentary rocks Seminoe Mountains (southeast end of Granite Mountains)—Pelitic schist,

Teton Range—Rendezvous Metagabbro; 2,875 Ma or older. **Wmu**

Wind River Range—Largely granite gneiss; contains diorite and quartz diorite

Pennsylvanian and

Bighorn Mountains—Quartz diorite to quartz monzonite. Age 2,900 + Ma.